
ORGANIC CHEMISTRY

by

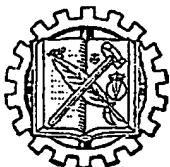
ALLAN R. DAY

*Professor of Chemistry
The University of Pennsylvania*

AND

MADELEINE M. JOULLIÉ

*Assistant Professor of Chemistry
The University of Pennsylvania*



D. VAN NOSTRAND COMPANY, INC.

PRINCETON, NEW JERSEY

TORONTO

LONDON

NEW YORK

BEST AVAILABLE COPY

D. VAN NOSTRAND COMPANY, INC.
120 Alexander St., Princeton, New Jersey (*Principal office*)
24 West 40 St., New York 18, New York

D. VAN NOSTRAND COMPANY, LTD.
358, Kensington High Street, London, W.14, England

D. VAN NOSTRAND COMPANY (Canada), LTD.
25 Hollinger Road, Toronto 16, Canada

COPYRIGHT © 1960, BY
D. VAN NOSTRAND COMPANY, INC.
Published simultaneously in Canada by
D. VAN NOSTRAND COMPANY (Canada), LTD.

Library of Congress Catalog Card No. 60-11062

*No reproduction in any form of this book, in whole or in part
(except for brief quotation in critical articles and reviews),
may be made without written permission from the publisher.*

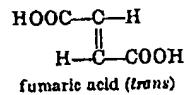
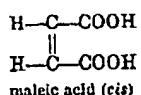
PRINTED IN THE UNITED STATES OF AMERICA

BEST AVAILABLE COPY

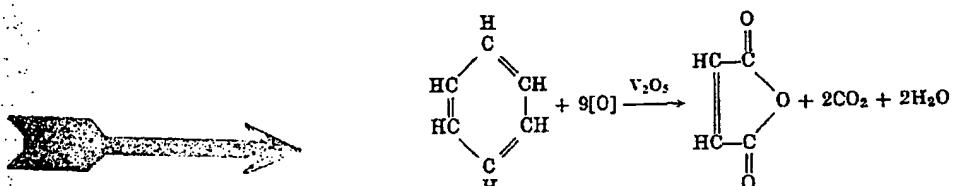
The Dieckmann condensation of diethyladipate gives a cyclopentanone derivative (Section 41.3c).

41.8 UNSATURATED ALIPHATIC DIBASIC ACIDS

a. Maleic acid and fumaric acid. These acids are geometric isomers of 1,2-ethenedicarboxylic acid.



Maleic anhydride is prepared by passing benzene vapor and air over vanadium pentoxide at 400–500°.



The anhydride may be hydrolyzed to maleic acid by heating it with water. Maleic acid melts at 130–130.5°; at 160° and above it is converted to the anhydride. Maleic acid is a stronger acid than fumaric acid and is quite soluble in water.

Fumaric acid occurs free in many plants. It does not melt, at atmospheric pressure, but sublimes at about 200°. Fumaric acid is difficultly soluble in water and is somewhat more stable than the *cis* form. It does not form a corresponding cyclic anhydride because the carboxyl groups are too far apart. At temperatures of 250–300°, fumaric acid undergoes isomerization and loss of water to form maleic anhydride.

When a concentrated solution of maleic acid in hydrochloric acid is heated, isomerization takes place and the less soluble fumaric acid separates. In this isomerization, the double bond must become a single bond temporarily so that rotation may occur.

